

Claims

- [c1] 1. A method of equalizing output current among a plurality of alternating current devices connected in parallel, the method comprising:
- measuring an output current of each device, thereby generating a plurality of output current signals;
 - selecting an output current signal having the largest magnitude, designated the highest output current signal;
 - providing the highest output current signal to a control input of each device;
 - comparing the output current signal for each device to the highest output current signal;
 - adjusting the output current of each device to match the output current corresponding to the highest output current signal.
- [c2] 2. A circuit for equalizing output current among a plurality of alternating current devices connected in parallel, the circuit comprising:
- a plurality of current sensors, each having an output signal corresponding to an output current of a corresponding alternating current device;

a selection circuit having inputs receiving output signals from each current sensor and having an output signal corresponding to the current sensor output signal having the greatest magnitude;

a plurality of summing circuits, each having a first input receiving a corresponding current sensor output signal and having a second input receiving the selection circuit output signal, each summing circuit generating an output error signal corresponding to the difference between the selection circuit output signal and the corresponding current sensor output signal;

a plurality of control circuits, each receiving as an input the corresponding error signal and adjusting the output current of the corresponding alternating current device to minimize the magnitude of the error signal.

[c3] 3.A power module comprising:

a PWM-controlled inverter

a current sensor, having an output signal corresponding to an output current of the power module;

a selection circuit having a first input receiving the output signal from the current sensor and having a second input receiving a signal corresponding to a highest output current of one or more other power

modules connected in parallel with the power module, said selection circuit generating an output signal corresponding to larger of the current sensor output signal and the highest output current signal from the other power modules;

a summing circuit, having a first input receiving the current sensor output signal and a second input receiving the selection circuit output signal, the summing circuit generating an output error signal corresponding to the difference between the selection circuit output signal and the current sensor output signal;

a PWM inverter control circuit, receiving as an input the error signal and adjusting a PWM signal supplied to the inverter so as to cause the output current of the power module to minimize the magnitude of the error signal.

[c4] 4. An uninterruptible power supply comprising one or more power modules in accordance with claim 3 connected in parallel.

[c5] 5. A method of equalizing output current among a plurality of alternating current devices connected in parallel, the method comprising:

measuring an output power level of each device;

adding the output power levels for each device to ar-

rive at a total output power;
dividing the total output power by the number of devices to derive an output power setpoint;
adjusting the output power of each device to match the output power setpoint.

[c6] 6. An uninterruptible power supply comprising:
a bay having a plurality of bays; and
at least one intelligent battery module having at least one battery string, a fuse, and a relay, all connected in series, the battery module further comprising a microprocessor based controller for monitoring and controlling the battery module components;
wherein the battery modules may be accommodated in any bay of the UPS frame.

[c7] 7. The uninterruptible power supply of claim 6 further comprising one or more power modules including:
a PWM-controlled inverter
a current sensor, having an output signal corresponding to an output current of the power module;
a selection circuit having a first input receiving the output signal from the current sensor and having a second input receiving a signal corresponding to a highest output current of one or more other power modules connected in parallel with the power module, said selection circuit generating an output signal

corresponding to larger of the current sensor output signal and the highest output current signal from the other power modules;

a summing circuit, having a first input receiving the current sensor output signal and a second input receiving the selection circuit output signal, the summing circuit generating an output error signal corresponding to the difference between the selection circuit output signal and the current sensor output signal;

a PWM inverter control circuit, receiving as an input the error signal and adjusting a PWM signal supplied to the inverter so as to cause the output current of the power module to minimize the magnitude of the error signal.

- [c8] 8.A floating safe connector consisting essentially of:
- a connector housing receiving a standard connector;
 - and
 - a plurality of locking tabs on the connector housing to retain the housing in the plane of an opening in a frame;
- wherein the opening in the frame is sufficiently larger than the connector housing to allow the connector housing to move within the plane of the opening, and wherein the connector housing shrouds the en-

ergized parts of the standard connector.

[c9] 9.A method of minimizing an interruption of an output voltage of a UPS during a bypass transition, the method comprising:

minimizing the time required for a bypass contactor to change states;

centering the time required for the contactor to change states about a zero crossing of the output waveform.

[c10] 10.The method of claim 9 wherein minimizing the time required for the bypass contactor to change states is accomplished by overdriving a coil of the bypass contactor.

[c11] 11.A shipping pallet comprising:

a pallet frame;

a plurality of padded feet affixed to a bottom of the frame;

a metallic bracing member affixed to the frame.

[c12] 12.The shipping pallet of claim 11 wherein the metallic bracing member may be configured as a ramp for unloading the pallet.